UNITED NATIONS

A

General Assembly

Distr.
GENERAL

A/AC.105/524
14 December 1992

ORIGINAL: ENGLISH

COMMITTEE ON THE PEACEFUL USES
OF OUTER SPACE

COORDINATION OF OUTER SPACE ACTIVITIES WITHIN THE UNITED NATIONS SYSTEM: PROGRAMMES OF WORK FOR 1993 AND 1994 AND FUTURE YEARS

Report of the Secretary-General

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INTRODUCTORY NOTE

The present report has been prepared by the Secretary-General at the request of the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space and concerns efforts at coordinating the activities of organizations within the United Nations system that relate to assistance to developing countries in the practical application of space technology.*

The report is based on the contributions submitted by the organizations concerned in response to the United Nations request for information on concrete programmes of work envisaged primarily for 1993 and 1994 and was reviewed in its draft form at the Inter-Agency Meeting on Outer Space Activities, held at the headquarters of the United Nations Educational, Scientific and Cultural Organization (UNESCO) in Paris, from 5 to 7 October 1992.

The report consists of two sections: section I presents a summary of major activities and programmes planned for 1993 and 1994 and future years by the organizations within the United Nations system as a whole; section II presents concrete activities or programmes planned by individual organizations in an integrated form under substantive headings - remote sensing, communications, meteorology, hydrology, space science, use of space technology for maritime communications and for air navigation and other activities in the field of space science and technology and its applications - rather than under organizations by which they are conducted. At the same time, in order to help the reader to identify the activities of each organization in specific fields, a matrix of outer space programmes, a list of acronyms as well as a list of organizations participating in outer space activities are provided.

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* This is the eighteenth such annual report. The first 17 reports were contained in documents A/AC.105/166, 183, 201, 223, 242 and 278, A/CONF.101/BP.11/Add.1, A/AC.105/309 and Corr.1, A/AC.105/325, 342, 359, 373, 389, 415, 444 and Corr.1, 465 and Corr.1 and 491 and Corr.1.

LIST OF ORGANIZATIONS PARTICIPATING IN OUTER SPACE ACTIVITIES

A. United Nations

Office for Outer Space Affairs (OOSA)

Remote sensing - paragraphs 12 (a-l), 27, 34-36, 91-92, 96, 112-113, 116-117

Communications - paragraphs 118 (a-c), 122

Meteorology - paragraphs 145-147

Basic space science - paragraph 171

International Space Year - paragraph 180

Office of Legal Affairs (OLA)

Communications - paragraph 136

Other activities in the field of space science and technology and its applications - paragraph 179

Department of Economic and Social Development (DESD)

Remote sensing - paragraphs 53-54

Department of Humanitarian Affairs (DHA), International Decade for National Disaster Reduction secretariat (IDNDR secretariat)

Remote sensing - paragraph 90

Communications - paragraphs 120-121, 131

United Nations Development Programme (UNDP)

Remote sensing - paragraphs 12 (m, n, p, q), 36, 54, 93

Meteorology - paragraphs 144, 148

United Nations Environment Programme (UNEP)

Remote sensing - paragraphs 12 (r-s), 21-23, 40, 52, 55-63, 68, 70, 79-84, 87 (d), 97-102, 111

Communications - paragraphs 128, 134

Meteorology - paragraphs 143, 155-158, 165

International Space Year - paragraph 183

United Nations Institute for Training and Research (UNITAR)

Remote sensing - paragraphs 19 (b), 21 (a, d, e), 22-24

Economic Commission for Africa (ECA)

Remote sensing - paragraphs 12 (a), 16-18, 20, 28-31, 37-39, 41, 54, 85-88, 94-96, 111, 116-117

Economic and Social Commission for Asia and the Pacific (ESCAP)

Remote sensing - paragraphs 12 (m-q), 15 (a-f), 30, 31, 54, 93

B. Specialized agencies

Food and Agriculture Organization of the United Nations (FAO)

Remote sensing - paragraphs 12 (i, t-x), 13-14, 32 (e), 33, 42-50, 52, 55, 57, 66, 70, 72-78, 85, 88-89, 103-105, 107, 109, 110, 111

Communications - paragraph 127

Meteorology - paragraphs 141, 148

International Space Year - paragraph 184

United Nations Educational, Scientific and Cultural Organization (UNESCO)

Remote sensing - paragraphs 12 (s), 26, 32, 64-69, 100, 111

Communications - paragraphs 125-126, 155, 165-169

Meteorology - paragraphs 155, 165-169

International Space Year - paragraph 181

United Nations Industrial Development Organization (UNIDO)

Remote sensing - paragraph 25

Other activities in the field of space science and technology and its applications - paragraph 178

International Civil Aviation Organization (ICAO)

Communications - paragraph 139

World Health Organization (WHO)

Remote sensing - paragraphs 70-71, 106

Communications- paragraphs 119, 129, 130, 135

Land, maritime and aeronautical mobile services - paragraph 174

International Space Year - paragraph 182

International Telecommunication Union (ITU)

Communications - paragraphs 123-124, 132-133, 136, 138

Meteorology - paragraph 170

Land, maritime and aeronautical mobile services - paragraphs 173, 177

World Meteorological Organization (WMO)

Remote sensing - paragraphs 12 (i), 52

Meteorology - paragraphs 141-142, 144, 148, 150-155, 159-165, 169

Land, maritime and aeronautical mobile services - paragraph 173

International Space Year - paragraph 185

International Maritime Organization (IMO)

Land, maritime and aeronautical mobile services - paragraphs 172-173, 175-176

World Intellectual Property Organization (WIPO)

Communications - paragraphs 125 (a), 140

World Bank

Remote sensing - paragraphs 51-52

Meteorology - paragraph 148 (a)

MATRIX OF OUTER SPACE PROGRAMMES*

	Remote sensing	Communications	Meteorology and hydrology	Basic space science	Mobile services	Other applications	ISY
OOSA	12 (a-l), 27, 34-36, 91-92, 96, 112-113, 116-117	118 (a-c), 122	145-147	171			180
OLA		136				179	
DESD	53-54						
DHA	90	120-121, 131					
UNDP	12 (m, n, p, q), 36, 54, 93		144, 148				
UNEP	12 (r-s), 21-23, 40, 52, 55-63, 68, 70, 79-84, 87 (d), 97-102, 111	128, 134	143, 155-158, 165				183
UNITAR	19 (b), 21 (a, d, e), 22-24						
ECA	12 (a), 16-18, 20, 28-31, 37-39, 41, 54, 85-88, 94-96, 111, 116-117						
ESCAP	12 (m-q), 15 (a-f), 30, 31, 54, 93						
FAO	12 (i, t-x), 13-14, 32 (e), 33, 42-50, 52, 55, 57, 66, 70, 72-78, 85, 88-89, 103-105, 107, 109-111	127	141, 148				184
UNESCO	12 (s), 26, 32, 64-69, 100, 111	125-126	155, 165-169				181
UNIDO	25					178	
ICAO		139					
WHO	70-71, 106	119, 129-130, 135			174		182
ITU		123-124, 132-133, 136, 138	170		173, 177		
WMO	12 (i), 52		141-142, 144, 148, 150-155, 159-165, 169		173		185
IMO					172-173, 175-176		
WIPO		125 (a), 140					
WB	51-52		148 (a)				

* The number in each column designates paragraphs.

ACRONYMS

AARS	Asian Association for Remote Sensing
ACMAD	African Centre of Meteorological Applications for Development
AOCRS	African Organization of Cartography and Remote Sensing (ECA)
ARTEMIS	Africa Real Time Environmental Monitoring Information System (FAO)
AVHRR	Advanced very high resolution radiometer
CAS	Commission for Atmospheric Sciences
CCIR	International Radio Consultative Committee (ITU)
CCITT	International Telegraph and Telephone Consultative Committee (ITU)
CILSS	Permanent Interstate Committee for Drought Control in the Sahel
CNS/ATM	Communications, navigation, and surveillance and air traffic management
COSPAR	Committee on Space Research (ICSU)
CRTO	Regional Centre for Remote Sensing at Ouagadougou (ECA)
CTD	Control of Tropical Disease (WHO)
DCP	Data collection platform
DHA	Department of Humanitarian Affairs (UNDRO)
DIANA	Data and Information Available Now in Africa (FAO)
EC	European Community
ESA	European Space Agency
FANS	Future Air Navigation System
FAORSC	FAO Remote Sensing Centre
FRA90	Forest Resources Assessment 1990 project (FAO)
GARS	Geological Applications of Remote Sensing (UNESCO)
GAW	Global Atmosphere Watch (WMO)
GDTA	Group for the Development of Aerospace Remote Sensing
GEMS	Global Environmental Monitoring System
GIEWS	Global Information and Early Warning System on Food Security (FAO)
GIS	Geographic Information System
GMDSS	Global Maritime Distress and Safety System (IMO)
GO_3OS	Global Ozone Observing System
GPS	Global Positioning System (United States of America)
GRID	Global Resource Information Database
IACC	Inter-Agency Consultative Committee

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ICPIC	International Cleaner Production Information Clearinghouse (UNEP)
ICSU	International Council of Scientific Unions
IFRB	International Frequency Registration Board (ITU)
IGADD	Intergovernmental Authority on Drought and Development
IGOSS	Integrated Global Ocean Station System (UNESCO/WMO)
IHO	International Hydrographic Organization
IHP	International Hydrological Programme
ILEC	International Lake Environment Committee
INFOTERRA	International Referral System for Courses of Environmental Information (UNEP)
IOC	Intergovernmental Oceanographic Commission (UNESCO)
IOMAC	Indian Ocean Marine Affairs Cooperation
ISCCP	International Satellite Cloud Climatology Project
ISLSCP	International Satellite Land-Surface Climatology Project
ISY	International Space Year
ITC	International Institute for Aerospace Survey and Earth Sciences (Netherlands)
IUCN	International Union for the Conservation of Nature
IUGS	International Union of Geological Sciences
LAC	Local Area Coverage
LIS	LANDSAT Information System
MARC	Monitoring and Assessment Research Centre (UNEP)
MDD	Meteosat Data Dissemination
MSS	Multispectral scanning
NASA	National Aeronautics and Space Administration (United States)
NOAA	National Oceanic and Atmospheric Administration (United States)
PDUS	Primary Data Users Station
RASCOM	Regional African Satellite Communications System
RCSSMRS	Regional Centre for Services in Surveying, Mapping and Remote Sensing (ECA)
RECTAS	Regional Centre for Training in Aerospace and Surveys (ECA)
RESPAS	Remote Sensing Preprocessing and Archiving System (FAO)
RIS	Regional Information Service (ESCAP/UNDP/RRSP)
RRSP	Regional Remote Sensing Programme (ESCAP/UNDP)

SADCC	Southern African Development Coordination Conference
SAFISY	Space Agencies Forum for International Space Year
SAR	Synthetic Aperture Radar
SPOT	Experimental Earth Observation Satellite (France)
TM	Thematic Mapper (LANDSAT satellite)
TREDMAR	Training and Education in Marine Science (UNESCO)
UNISPACE 82	Second United Nations Conference on the Exploration and Peaceful uses of Outer Space
WCRP	World Climate Research Programme
WWW	World Weather Watch (WMO)

Section I

SUMMARY OF MAJOR ACTIVITIES AND PROGRAMMES PLANNED FOR 1993 AND 1994 AND FUTURE YEARS

1. The organizations within the United Nations system have planned activities for 1993 and 1994 and future years within the categories of remote sensing, communications, meteorology and hydrology. Organizations within the United Nations system will also conduct valuable outer space-related or -aided activities in basic space sciences and in land, maritime and aeronautical communications and other activities related to space science and technology and its applications. The planned activities generally range from education and training programmes, through fellowships, training workshops and summer schools, to expert services and survey missions to identify specific areas of applications relevant to a given country or group of countries and to carry out relevant studies or pilot projects as well as to disseminate information on the status of technology. Also, organizations within the United Nations system are preparing regional feasibility studies and designing education training programmes in remote sensing and satellite communications to establish indigenous capabilities in developing countries. In addition, there are other ongoing activities relating to the regulation and utilization of space activities.

2. In the area of remote sensing, the United Nations and its specialized agencies have planned a number of international, regional and national training courses and workshops. They cover remote-sensing applications in general as well as specialized topics such as the use of space techniques for monitoring and control of the desert environment, microwave remote sensing, use of integrated agrometereological and remote-sensing inputs by regional and national early warning systems on food security in Africa, as well as the Geographic Information System (GIS) and remote sensing for sustainable management of the biosphere reserves. Most of these international and regional training courses are jointly organized by two to four organizations within the United Nations system, often in cooperation with other international organizations and/or Governments. National courses on remote-sensing applications are also planned in a number of developing countries. Further evaluation missions to establish centres for space science and technology education will be carried out. Fellowships in the area of remote sensing will also be offered in the 1993-1994 period by a number of international organizations and Member States.

3. Many of the organizations of the United Nations will offer expert services in their respective areas of competence. A number of pilot projects relying on remote-sensing applications include mapping, assessment and monitoring of renewable natural resources and natural disasters, environmmental monitoring, desertification control and vegetation monitoring. Also, special projects are being carried out in marine pollution, tropical forest management and assessment of water resources. In the area of dissemination of information on remote-sensing technology, organizations either provide information upon request or issue newsletters and technical

publications on regional or sectoral development of remote-sensing capabilities.

4. Regarding communications, a number of projects, training courses, workshops and seminars are planned in such areas as the use of communications systems to support primary health care, as well as its use to combat natural disasters and assist in disaster relief operations. Fellowships in the field of communications are also offered through the United Nations system with the cooperation of the agencies of Member States.

5. Various expert and technical advisory services are offered in the planning of global and regional satellite communications systems as well as Earth station projects and satellite communications, navigation and surveillance for international civil aviation. During 1993, the Food and Agriculture Organization of the United Nations (FAO), in cooperation with the European Space Agency (ESA), will complete testing on the DIANA satellite telecommunications system, linking FAO headquarters through microcomputer-based terminals with its Regional Office for Africa in Accra, Ghana; the Regional Centre for Services in Surveying, Mapping and Remote Sensing (RCSSMRS) in Nairobi, Kenya, and the Department of Meteorological Services in Harare, Zimbabwe. MERCURE, a project closely allied with DIANA which is to start in late 1994, aims at providing global communication coverage for the United Nations Environment Programme (UNEP) for the transfer of information between UNEP headquarters and affiliated centres and between GRID and other archives and users of environmental data. Regional study projects for establishing satellite communications networks are being carried out; one of particular importance is being carried out in the Regional African Satellite Communications System (RASCOM). The RASCOM organization will start operations by pooling the transponders of countries with domestic networks. Studies in the field of radiocommunications in the wake of the resolutions and recommendations of the World Administrative Radio Conference (WARC-92) are forthcoming. Ways are sought of making wider use of satellite systems for education. Furthermore, the organs concerned will disseminate information on services and studies and hold conferences to inform the Member States thereon.

6. The application of satellite technology forms an important element of technical cooperation activities in both meteorology and hydrology. A series of workshops and seminars is planned for 1993 and 1994 on various aspects of satellite meteorology and its applications. A number of technical cooperation activities in meteorology and operational hydrology are planned in Member States. Additional activities will focus on the use of space technology for the study of tropical meteorology and tropical cyclones.

7. In sectors of development that depend on the application of meteorology and agrometeorology, organizations within the United Nations system, including the Economic Commission for Africa (ECA), UNEP, the United Nations Development Programme (UNDP), the United Nations Educational, Scientific and Cultural Organization (UNESCO), FAO and the World Meteorological Organization (WMO),

plan a series of activities. The use of data collection and dissemination capabilities on geosynchronous meteorological satellites is growing rapidly. Under the World Climate Programme, various climate monitoring activities will be undertaken involving the use of satellite data. The recently established Global Climate Observing System (GCOS) will meet the information requirements in such areas as monitoring of the Earth climate, climate research and climatological applications to national economies and development. A series of technical reports and publications on activities in other areas such as ozone depletion will be made available.

8. In basic space sciences, the United Nations has planned a workshop to benefit ECA member States. Also, a series of fellowships in space research, of a duration of one to three years, will be offered. The United Nations, through its Programme on Space Applications, will continue to collaborate with the Committee on Space Research (COSPAR) to support the space research activities of scientists from developing countries.

9. The work of the specialized agencies of the United Nations is also making significant contributions in new areas of applications of space technology for land, maritime and aeronautical mobile communications. For disaster management, the use of the satellite transceiver for prompt response is being assessed. Further progress is being made towards the development of the Global Maritime Distress and Safety System (GMDSS), which is being introduced in stages and is to be fully implemented at the turn of the century; ships are being encouraged to include satellite equipment. Technical and operating characteristics necessary for compatibility, interoperability and required performance levels for systems in the mobile satellite services are being studied.

10. In the use of mobile satellite services in air navigation, further progress is being made towards establishing air-ground data links for use by air traffic services.

11. The Committee on the Peaceful Uses of Outer Space at its 1992 session was able to reach consensus on a set of principles relevant to the use of nuclear power sources in outer space and recommended their adoption by the General Assembly. The Committee noted the need for early review and possible revision of the principles. Its Legal Subcommittee will therefore, subject to the decision of the General Assembly, consider in 1993 the question of early review and possible revision of the principles relevant to the use of nuclear power sources, to consider matters relating to the definition of outer space and to the geostationary orbit and to consider legal aspects of the sharing of the benefits of the exploration and utilization of outer space, taking into account the needs of the developing countries.

Section II

ACTIVITIES PLANNED BY THE ORGANIZATIONS WITHIN THE UNITED NATIONS SYSTEM FOR 1993 AND 1994 AND FUTURE YEARS

A. REMOTE SENSING

1. Education and training programmes

Training courses/workshops/seminars

12. The following training courses/workshops/seminars are being planned by the organizations within the United Nations system in 1993 and 1994:

(a) United Nations/ECA Eighth Cartographic Regional Conference for Africa, Addis Ababa, February 1993;

(b) United Nations/ESA Training Course on Monitoring, via ERS-1 Satellite, of Natural Resources, Renewable Energy and Environment, to be held in cooperation with ESA, Frascati, Italy, April 1993;

(c) United Nations/Indonesia Regional Conference on Space Technology for Sustainable Development, to be held in cooperation with the Government of Indonesia, Bandung, May 1993;

(d) Third United Nations/Sweden Training Course on Remote Sensing Education for Educators, to be held in cooperation with the Government of Sweden, Stockholm/Kiruna, May/June 1993;

(e) United Nations/Mexico Regional Workshop on Space Technology to Combat Natural Disasters, to be held in cooperation with the Government of Mexico, Mexico City, September 1993;

(f) United Nations/Germany Regional Training Course on Remote Sensing Applications to Geological Sciences, to be held in cooperation with the Government of Germany, Berlin/Potsdam, October 1993;

(g) United Nations Regional Conference on Africa's Environmental and Natural Resources Information and Management Needs, October 1993;

(h) United Nations/Economic and Social Commission for Western Asia (ESCWA) Workshop on the Use of Space Techniques for Monitoring and Control of the Desert Environment, ESCWA region, November 1993;

(i) Seventh United Nations/FAO/WMO/ESA Training Course on Microwave Remote Sensing for Africa, 1994;

(j) Fourth United Nations/Sweden Training Course on Remote Sensing Education for Educators, to be held in cooperation with the Government of Sweden, Stockholm/Kiruna, 1994;

(k) United Nations/Germany Regional Training Course on Remote Sensing Applications to Geological Sciences, to be held in cooperation with the Government of Germany, Economic Commission for Latin America and the Caribbean (ECLAC) region, 1994;

(l) United Nations Regional Workshop on Space Technology to Combat Natural Disasters, to be held in the Economic Commission for Europe (ECE) region in 1994;

(m) Economic and Social Commission for Asia and the Pacific (ESCAP)/UNDP Training Workshop on Spatial Data Management for Natural Resource Assessment, India, March 1993;

(n) ESCAP/UNDP Workshop on the Use of GIS for Urban Management, Sri Lanka, May 1993;

(o) ESCAP Regional Seminar on Remote Sensing and GIS in the ESCAP region in 1994, venue to be decided;

(p) ESCAP/UNDP Regional Training Courses on Remote Sensing and GIS in Asia in 1994, 1995 and 1996, venues to be decided;

(q) ESCAP/UNDP Subregional Training Courses in the South Pacific in 1994 and 1995;

(r) UNEP plans to hold a regional training course on "Remote Sensing Techniques in Water Resources Assessment and Management", under the UNEP/ESCWA/Islam Development Bank project entitled "Assessment of water resources in the ESCWA region using remote sensing techniques", ESCWA region, April 1993;

(s) UNEP plans to hold training courses, if funds become available, similar to a training course held in June 1992 in Kenya on "Geophysical Methods for Groundwater Exploration" under the auspices of the African Ministerial Conference on the Environment (AMCEN) and co-funded together with UNESCO and the Commonwealth Science Council, in Africa, 1993 and 1994;

(t) FAO Training Course on Agricultural Applications of Remote Sensing, Porto Alegre, Brazil, January 1993;

(u) FAO/German Foundation for International Development (DSE) regional training course on forestry remote sensing and GIS applications, in cooperation with the Government of Malaysia, 1993;

(v) FAO plans to organize a seminar on remote sensing and satellite communications for decision-makers in 1993, venue to be decided;

(w) FAO will continue to organize training courses on the use of integrated agrometeorological and remote-sensing inputs by regional and national early warning systems on food security in the Intergovernmental

Authority on Drought and Development (IGADD) and Southern African Development Coordination Conference (SADCC) regions in Africa during 1993 and 1994;

(x) FAO Workshop on Satellite-based Estimates of Rainfall, West Africa, 1993 or 1994.

13. FAO will hold an Expert Consultation on Agricultural Crop Forecasting based on Integrated Agrometeorological and Remote Sensing Techniques, Rome, 1993.

14. FAO/Commission of the European Communities (CEC)/ESA, in cooperation with Telespazio, will organize the Third Workshop for Decision-Makers on Agricultural and Environmental Applications for Remote Sensing and GIS in Romania in 1993.

15. ESCAP will organize the following meetings:

(a) ESCAP Symposium on Remote Sensing and GIS for Natural Disaster Protection and Mitigation, Viet Nam, August 1993;

(b) ESCAP/Asian Association for Remote Sensing (AARS) Asian Conference on Remote Sensing, venue to be decided, 1993;

(c) ESCAP Focal Point Meeting for South Pacific, Remote Sensing and GIS for Land and Marine Applications, venue to be decided, 1993;

(d) Ministerial Level Meeting on Space Applications for Sustainable Natural Resources Management and Environmental Monitoring in the ESCAP region, venue to be decided, 1993;

(e) ESCAP Regional Symposium on Remote Sensing and GIS in the ESCAP region, venue to be decided, 1995 and 1996;

(f) ESCAP Meeting of the Directors of the National Remote Sensing Centres/Programmes in the ESCAP Region; tenth session of the Intergovernmental Consultative Committee, Tripartite Review Meeting of the Regional Remote Sensing Programme, Islamic Republic of Iran, October 1993; eleventh session, Bangladesh, 1994; twelfth session, Viet Nam, 1995; thirteenth session, Mongolia, 1996.

16. RCSSMRS will continue its role of catalyst in the transfer of remote sensing and GIS technologies to countries in the Eastern and Southern Africa subregion. The Centre is expanding its capacity and abilities to meet increased demand for training and execution of projects with remote-sensing components.

17. RCSSMRS will continue to offer short courses of three weeks' duration in a number of natural resources disciplines. Customized courses are also undertaken; maximum number of participants is usually 25.

18. The Regional Centre for Training in Aerospace and Surveys (RECTAS), Ile-Ife, Nigeria, with the support of the European Community (EC)/International Institute for Aerospace Survey and Earth Sciences (ITC)/GDTA/RECTAS project and the GDTA/RECTAS Protocol agreement, will conduct the following activities:

(a) Training workshop on GIS/LANDSAT Information System (LIS);

(b) Technical assistance to some remote-sensing laboratories in Nigeria for restoration/maintenance of their software systems, which are in harmony with systems at RECTAS;

(c) Remote sensing applications workshop;

(d) Digital image processing workshop.

RECTAS will continue to offer long-term training courses in remote sensing at the technician, technologist and postgraduate levels.

19. The Regional Centre for Remote Sensing at Ouagadougou (CRTO) will offer for 1993-1994 the following training courses:

(a) Two 10-month postgraduate courses entitled "Regular Remote Sensing Cycle comprising Technology, Applications and Specialization";

(b) Three-month courses on Geographic Information Systems, organized in cooperation with GEMS/UNITAR, for engineers, researchers and high-level technicians from Member States;

(c) Short practical training courses (June-August) on "Introduction to Remote Sensing for Educators" from schools with academic programmes on environmental education;

(d) A seminar on "Environmental and Special Remote Sensing Information System" will be organized jointly with GDTA for 22 participants from member States in May or June 1993.

20. RCSSMRS will establish at the beginning of 1993 a GIS centre to facilitate the training of individuals from the Eastern and Southern African subregion.

21. Training programmes of the United Nations Institute for Training and Research (UNITAR) in GIS, remote sensing and image processing for management of natural resources and the environment, ongoing for six years, are conducted with UNEP, the Swiss Ecole Polytechnique Fédérale de Lausanne (EPFL), the Graduate School of Geography, Clark University, United States, and the Environmental Systems Research Institute (ESRI) of Redlands, California. UNITAR will conduct the following courses for 1993 and 1994 and beyond:

(a) UNITAR/HABITAT training programme in the applications of GIS in population distribution, energy and environment, Cairo, January 1993;

(b) Advanced regional GIS training workshop/seminar for environmental management conducted in cooperation with EPFL and the University of Chile, Santiago, Chile, March 1993;

(c) Introductory and advanced GIS workshops, in cooperation with the International Centre for Integrated Mountain Development (ICIMOD) and ICIMOD's Mountain Environmental Natural Resource Information Systems (MENRIS), Kathmandu, 1993;

(d) The Global Environmental Monitoring System (GEMS)/UNITAR/United Nations Sudano-Sahelian Office (UNSO) training programme in GIS and GIS-related topics for scientists and planners from member States of the Permanent Interstate Committee for Drought Control in the Sahel (CILSS) at the AGRHYMET centre, Niamey, Niger, 1993;

(e) UNITAR seminar relating GIS to health topics, in cooperation with the Sao Paulo municipality and the Italian Development Cooperation, Sao Paulo, Brazil, 1993.

22. UNEP and UNITAR, as an Earthwatch activity, are working jointly to establish and maintain Environment Information System (EIS) capabilities and networks to support decision-making processes at national, subregional, regional and global levels to help with decision-making processes for sustainable use and development of natural resources, including the maintenance of biodiversity, the estimation of impacts of climate change, the management of water resources, etc. GIS and satellite-based remote-sensing technologies are perceived as appropriate sources of information for these networks, which will also support existing subregional and regional programmes, for example, at the regional and global level by linking subregional and national EIS and the specialized databases of UNEP and other organizations. This will facilitate regional and global assessments of major environmental issues, state-of-the-environment reports, and provide early warning of and initiate responses to environmental changes.

23. UNEP, through GEMS and the Global Resource Information Database (GRID), in collaboration with UNITAR, created in their Africa programme operational GIS and satellite remote-sensing capabilities in three CILSS member States (Burkina Faso, Mali and Niger) where national pilot projects are under way. A subregional technical programme for environment systems and national environmental information systems (EIS)/GIS units among CILSS member States was established at AGRHYMET, in Niamey, Niger, in March 1992. The programme provides: a one-month training course in GIS at AGRHYMET, for 12 participants from CILSS member States; technical backstopping for national EIS/GIS units, which will consist of short (one-week) visits to the national units to assist with programme activities, technical problems, in-house training, etc., and a subregional technical workshop. The first training cycle was held in 1992; the second training cycle is scheduled to be held in January 1993.

24. The GEMS/GRID/UNITAR Africa programme has also established EIS/GIS units in five States members of SADCC (Botswana, Lesotho, Mozambique, the United

Republic of Tanzania and Zambia). In cooperation with the SADCC Environment and Land Management Sector Coordination Unit, the German Society for Technical Cooperation (GTZ) and the International Union for the Conservation of Nature (IUCN), a subregional technical support programme similar to the one in CILSS is being established through the national Remote Sensing Facility in Harare, Zimbabwe. The first GIS/RS training cycle for participants from national EIS/GIS units in the SADCC member States was implemented in 1992 and forms the basis for future annual training cycles in GIS and image processing for nationals of the SADCC subregion.

25. The United Nations Industrial Development Organization (UNIDO) plans to promote, in cooperation with the Government of India, training for decision-makers and technicians in the area of remote-sensing applications focusing on identification, classification and monitoring of raw materials resources.

26. UNESCO will organize, in cooperation with the National Committees of the International Hydrological Programme (IHP) of Indonesia and Kenya, and with the Man and the Biosphere (MAB) programme national committees, regional seminars and training courses on GIS and remote sensing for sustainable management of the biosphere reserves in 1993.

Fellowships

27. The United Nations Programme on Space Applications, together with a number of Governments and international organizations, provides long-term fellowships for candidates from developing countries to undertake in-depth education, as follows:

(a) The Brazilian Government has ongoing fellowships for 10 participants from Latin America and the Caribbean and the African countries in alternate years to undertake remote-sensing research and applications programmes at the Brazilian National Institute for Space Research (INPE). The participants for 1993 will be from the English-speaking African/Caribbean countries, and for 1994 will be from the Spanish-speaking Latin American and Caribbean countries;

(b) The Government of China is offering six fellowships for participants from developing countries in remote sensing, photogrammetry and geodesy in 1993;

(c) ESA has renewed its offer of a one-year fellowship in remote-sensing information systems tenable at the European Space Research Institute (ESRIN), Frascati, Italy, in 1993. It has also initiated a one-year fellowship for in-depth research education in remote-sensing instrumentation.

28. ECA, in support of human resources development in remote sensing and GIS in Africa, will continue to solicit fellowships from the agencies within the United Nations as well as other donor countries and agencies.

29. RECTAS will provide student fellowships to its member States through projects funded by the European Community, the French Government and the

Government of the Netherlands until 1994. The projects are co-executed by ITC and GDTA, and implemented jointly with RECTAS.

30. ESCAP/Regional Remote Sensing Programme (RRSP) plans to offer matching travel support for two 9 to 12-month in-depth research-oriented studies. Fellowship studies will be granted by member Governments in 1993.

31. ESCAP/RRSP plans to organize fellowships of 9 to 12 months' duration from participating member Governments from 1994 to 1996.

32. In the next few years, UNESCO will support the following postgraduate training courses dealing with the applications of remote sensing to integrated natural resources research, management and development:

(a) Postgraduate course in integrated study and rational use of natural resources at the universities of Paris, Montpellier and Toulouse, France;

(b) International postgraduate training courses on remote-sensing applications, digital image processing and aerospace surveys for applied geomorphology and engineering geology will be conducted at the International Institute for Aerospace Survey and Earth Sciences (ITC), Enschede, the Netherlands;

(c) An international postgraduate training course on photo-interpretation applied to civil engineering and to geology will be given at the Instituto Geográfico Agustén Codazzi (IGAC); Santa Fe de Bogotá;

(d) UNESCO's Marine Sciences Training and Education Programme (TREDMAR) will release its fourth computer-based learning module, "Applications of Marine and Coastal Image Data - from satellite, airborne and in-situ sensors", in early 1993 and the fifth in 1994. The latter will be in the form of a CD/ROM and contain all of the existing lessons of the series with pertinent modifications, enhancements and local variations suggested by the users. The overall objective, to help strengthen international satellite oceanography training and education, is gradually being realized through the growing network of lesson users and producers. At present, the network consists of over 400 principal recipients in about 65 countries who are using the modules for teaching, continuing education and as a research tool. About 10 per cent of them have expressed an interest in contributing lessons;

(e) UNESCO, within the framework of IHP and in cooperation with FAO and ITC, organizes training courses on the use of remote-sensing images and geographical information systems in water resources studies;

(f) The Intergovernmental Oceanographic Commission (IOC) of UNESCO organizes regional training courses on the applications of satellite remote sensing to marine studies, making use of the aforementioned computer-based learning modules; these training courses should continue in 1993 and beyond.

33. FAO will continue providing fellowships and organizing study tours within the framework of remote-sensing technology transfer activities of field projects.

2. Expert services and survey missions to identify specific areas of applications relevant to a given country or group of countries and to carry out specific studies on pilot projects

Provision of expert services

34. The United Nations Programme on Space Applications will be working very closely, on request, with the Government of Ecuador in order to promote cooperation between the Government of Ecuador and all the countries that are within the coverage area of the Cotopaxi Ground Station by means of appropriate consultation with those Governments. The end result of these consultations should witness an agreement with all those countries and ensure a continuous operation of the Cotopaxi Station and the acquisition of data to those countries.

35. The United Nations Programme on Space Applications is providing assistance to the Government of the Islamic Republic of Iran to organize a Seminar on Remote Sensing of Environment and Earth Resources in the near future.

36. The United Nations Programme on Space Applications and UNDP are providing assistance to the Government of Chile to organize the Second Space Conference of the Americas, to be held at Santiago in January 1993.

37. ECA will continue to provide, on request, advisory missions to member States upon appraisal of the status of cartography and remote sensing and institutional capabilities.

38. ECA continues to provide technological and managerial advisory services to the regional centres and organizations that are under its auspices, namely, RCSSMRS, RECTAS, CRTO and the African Organization of Cartography and Remote Sensing (AOCRS) at Algiers.

39. RCSSMRS is stocking its archives with Thematic Mapper (TM) and SPOT imagery for use in the Eastern and Southern African subregion projects. Systems are being developed for easy retrieval and distribution of processed data to users. Photolab productions continue to increase in both variety and quality following the acquisition of new automatic processors.

40. The UNEP Office for Harmonization of Environmental Measurements (HEM), as part of Earthwatch, is monitoring the development of sensors to be installed on spacecraft for measurement of environmentally relevant substances or the conditions of environmental regimes such as air, water, soil and biota, and will encourage the development of harmonized environmental measurements from

satellite sensors. HEM activities (see A/AC.105/491 and Corr.1, para. 51) will result in an expert meeting to be held at the end of 1992/early 1993 to review existing vegetation classification systems and to propose a generalized system which can be used globally from ground-based mapping to space imagery classification.

41. RCSSMRS is continuing its cooperation with funding agencies to complete the establishment in Nairobi of a ground receiving station which will enhance remote-sensing applications in the region.

42. The FAO Remote Sensing Centre (FAORSC) provides technical support to some 50 field projects annually in Africa, Asia, and Latin America and the Caribbean (see A/AC.105/465 and Corr.1, para. 39).

43. FAO will continue to assist its regional offices, United Nations regional economic commissions and regional remote-sensing centres in the efficient use of appropriate remote-sensing technology for the mapping, assessment and monitoring of renewable natural resources and natural disasters.

44. FAO, under the auspices of a United States Agency for International Development (USAID) project, is assisting in developing a Nile forecasting centre within the Ministry of Public Works and Water Resources in Cairo to monitor and forecast the flows of the Nile River and its tributaries. The project is designed to assist Egyptian planners in the more effective regulation of the Nile waters stored in Lake Nasser, with an integral part involving the real-time receipt and processing of environmental satellite data for precipitation estimation. The project is being carried out with the National Weather Service of the United States National Oceanic and Atmospheric and Space Administration (NOAA) as a subcontractor for the development of hydrological models. PDUS and MDD stations were installed at the Nile Forecasting Centre in Cairo and are operating on line with a computerized hydrological forecasting model based on the application of GIS technology. It is foreseen to expand the geographical coverage of the model to include the whole Nile River basin.

45. The FAO Fisheries Department plans to install a satellite ground receiving station for NOAA-AVHRR high-resolution LAC image data. The station will be used for satellite limnology, in support of FAO/Finnish International Development Agency (FINNIDA) project, "Research for the Management of Fisheries on Lake Tanganyika".

46. FAO will continue its assistance to the Government of Afghanistan in preparing for the rehabilitation of the agricultural sector through an inventory of current land utilization (see A/AC.105/491 and Corr.1, para. 50).

47. FAO will implement phase II of its regional remote-sensing/food security early warning project for the SADCC countries, with possible funding by the Government of the Netherlands, and is exploring the continuation of its sister project for the IGADD countries.

48. FAO continues to assist the Government of Buenos Aires Province, Argentina, in strengthening its Remote Sensing Centre and capacity for agricultural applications of remote sensing.

49. FAO will continue to promote cooperation between Latin American countries in agricultural and environmental applications of remote sensing and GIS through active participation in Space America conferences and provision of advisory services. FAO will also assist in preparing a project proposal for the establishment of regional remote-sensing institutional networks.

50. FAO continues to assist the countries of Central Europe in increasing their capacities for agricultural and environmental applications of remote sensing and GIS. In particular, FAO will continue to offer advice on the use of remote sensing and GIS in planning and implementing agricultural land reform and in the assessment and monitoring of environmental damage.

51. The World Bank's programme in remote-sensing technology will focus on project-specific activities and selected national surveys and mapping programmes in 1993. The World Bank will expand its role in remote-sensing activities to include: (a) development of collaborative programmes with other international organizations, public interest groups, non-governmental organizations, scientific bodies and the private sector; (b) provision of technical assistance to World Bank member Governments in the design and implementation of remote-sensing and GIS applications; (c) provision of training for Bank staff; and (d) development of research programmes on remote-sensing applications.

52. The World Bank will pursue cooperative natural resource and environmental database development programmes with international agencies, such as UNEP, FAO, IOC, WMO, WRI, as well as non-governmental organizations.

Study and pilot projects

53. The United Nations Department of Economic and Social Development (DESD) will continue to include and use new methodologies for resources exploration and studies related to the application of sophisticated digital image processing in response to requests from the Committee on Natural Resources. Also, in response to requests of member States, DESD will continue to assist in the design, execution and financing of remote-sensing projects that have training, consultancy and delivery of equipment as major components. With respect to operational activities; DESD will further provide its technical advisory services and project execution.

54. ESCAP/UNDP/RRSP plans to offer in 1993 two or three pilot projects on a regional scale to be arranged through DESD with the participation of several countries.

55. UNEP, in cooperation with FAO, through its GRID-Geneva facility, is taking the lead role in providing GIS and remote-sensing analysis to merge existing forest/non-forest 1 km AVHRR data sets into a global coverage.

Current data sets include West Africa and Amazonia. Various cooperating bodies (the Goddard Space Flight Center of the National Aeronautics and Space Administration (NASA), United States, the Earth Resource Observation System (EROS) Data Center of the United States Geological Survey, the Joint Research Centre of the EC, the Woods Hole Research Institute and the GRID-Sioux Falls and GRID-Bangkok facilities of UNEP) are contributing to this cooperative effort in order to increase global coverage. This work is closely dependent upon the development of a global land characterization data set (see para. 58 below), and is expected to continue into the 1994-1995 biennium.

56. UNEP-GRID, through its Sioux Falls facility, will promote during 1993-1995 the creation of Global Land Characterization data sets of medium-resolution (1 km pixels, roughly 1:1 M scale) which can be reliably and repeatedly sensed from space sensors such as the NOAA-x AVHRR. A regional approach, beginning with the EROS Data Center North American data set, followed by Latin America, South-East Asia, Africa, Australia, Europe and the rest of Asia, is to be adopted. Development is to include UNEP-brokered regional expert group meetings at GRID cooperating centres to review, modify and agree upon land cover/land use classification on the preliminary digital regional data sets. The final product will be a valuable global, regional and, in some cases, national land change monitoring tool.

57. In the context of the global land characterization activity and in support of various forest assessment initiatives (FAO, EC-Tropical Ecosystem Environment Observations by Satellite), UNEP, through the GRID-Bangkok facility, has completed the creation of a relatively cloud-free AVHRR mosaic resolution data set using selected daily images and covering from longitudes 81 East to 120 East and from latitudes 29 North to 10 South, and is undertaking field checking related to forest/non-forest classification of a part of this data set.

58. UNEP's cooperation with the International Board for Plant Genetic Resources (IBPGR) will continue in 1993 (see A/AC.105/491 and Corr.1, para. 61).

59. UNEP, through its desertification control programme, will continue work in association with the Institut Geographique Nationale (IGN) of France (see A/AC.105/491 and Corr.1, para. 63).

60. UNEP, as part of its lithosphere programme, and in cooperation with the Scientific Committee on Problems of the Environment (SCOPE) of the International Council of Scientific Unions (ICSU) and the Institute of Biogeochemistry and Marine Chemistry, Hamburg, Germany, is cooperating in a study of particle flux in the ocean using remotely sensed measurements to obtain data on global-scale variability in the concentration of chlorophyll in the upper ocean. The project will contribute to the Joint Global Ocean Flux Study of the International Geosphere-Biosphere Programme.

61. As Earthwatch activities carried out through its GRID-Bangkok facility (see also A/AC.105/491 and Corr.1, para. 70), UNEP is continuing its

collaboration with the National Environment Board of Thailand and the Prince Songkla University of Thailand in producing land cover type maps of Lake Songkla in southern Thailand from Landsat Multispectral scanning (MSS) (1976) and TM (1990) data, which will be used for the environmental assessment of the basin conducted by the International Lake Environment Committee (ILEC).

62. UNEP will continue, as an Earthwatch activity, through the Norwegian National GRID-Arendal facility, the development of a GIS database for the Baltic Sea catchment area, incorporating remotely sensed data (see A/AC.105/491 and Corr.1, para. 71).

63. UNEP will continue, as an Earthwatch activity and through its Soils programme, Soils and Terrain database activities (SOTER) in 1993-1994 (see A/AC.105/491 and Corr.1, para. 72).

64. UNESCO and ITC will continue to implement the cooperative programme "Geo-information for environmentally sound management of natural resources", which involves the application of GIS and remote sensing and training activities in the field of ecology, hydrology and geology (see also para. 33 above).

65. Within the framework of the MAB programme and in cooperation with the National Institute for Research in the Amazon (INPA-Brazil) and the Institut Français de Recherche Scientifique pour le Développement et Coopération (ORSTOM-France), UNESCO is developing a multidisciplinary research programme on the economic and ecological sustainability of tropical forest management in the Central Amazonia region. Remote sensing technologies will be used for natural resource surveying and mapping.

66. UNESCO will establish a remote-sensing centre at the Libyan Secretariat for Scientific Research, within the framework of a research project aimed at studying the natural resource potential in the south of the Libyan Arab Jamahiriya. FAO will cooperate in establishing the centre relating to agricultural applications.

67. UNESCO, in cooperation with the Center for Remote Sensing of Boston University, United States, will assist the Omani authorities in establishing a geographical information system and a digital image processing laboratory.

68. UNEP and UNESCO will carry out a feasibility study on the existing remote-sensing centres in the Arab region in order to establish a regional remote-sensing network.

69. UNESCO, with the International Union of Geological Sciences (IUGS) and the Royal Museum of Central Africa (Belgium), will implement the third phase of the Geological Applications of Remote Sensing (GARS) Africa project, which aims to develop a remote-sensing user network in Burundi, Rwanda, Uganda, the United Republic of Tanzania and Zambia. UNESCO will also implement, together with IUGS, a new phase of the GARS Latin America project on the use of microwave space-borne sensor data for the mitigation of natural hazards in the Andean region.

70. The WHO programmes in tropical diseases research (TDR), Control of Tropical Disease (CTD) and environmental health (EHE) continue to investigate the opportunities offered by remote sensing for improving research and control of vector-borne diseases. The Joint WHO/FAO/UNEP/United Nations Centre for Human Settlements (UNCHS) Panel of Experts on Environmental Management for Vector Control (PEEM) plans to promote, together with the USAID Vector Biology and Control Project, based in Washington, D.C., the incorporation of health information and remotely sensed data on health determinants into a GIS for integrated river basin management in Morocco.

71. The information system of the WHO Division of Emergency Relief Operations is being strengthened and adapted to country needs following a pilot study launched in India in 1992. In addition, the Pan-African Centre for Emergency Preparedness and Response at Addis Ababa, Ethiopia, has developed a mapping project to monitor the emergency situation in Africa using the statistics obtained from the database system. The mapping project is intended to assist managers working in the preparedness and response areas.

72. Through the second phase of a project funded by the Government of France, FAO continues to develop operational and cost-effective techniques and projects on the use of high-resolution satellite data and geographic information systems in the agriculture, forestry and fisheries sectors in developing countries. Development and testing of these techniques are based on pilot and field projects implemented in close cooperation with FAO services specialized in respective applications and with counterpart institutions in host countries. A particular group of these pilot projects concerns development - in cooperation with the FAO Investment Centre - of the appropriate use of remote-sensing data in designing rural investment projects to be submitted for multilateral financing. Other pilot projects are being implemented jointly with other United Nations agencies, such as the International Fund for Agricultural Development (IFAD) and the World Food Programme (WFP).

73. FAO and ESA will continue their cooperation in developing appropriate techniques for the applications of satellite Synthetic Aperture Radar (SAR) imagery to agriculture and forestry in developing countries (see A/AC.105/465 and Corr.1, para. 53).

74. FAO is assisting the Remote Sensing and Meteorological Centre (CEPSRM) of the Federal University in Rio Grande do Sul, Brazil, in developing a methodology for the identification of rice plantations on high-resolution satellite imagery.

75. FAO will continue its assistance to Bangladesh through a remote-sensing project which includes 10 pilot studies for development of operational remote-sensing applications to water resources, land use mapping, land degradation mapping, forest monitoring and aquaculture development.

76. FAO will also continue its study on the use of time series of ARTEMIS vegetation assessments to improve estimates of the length of the growing period and its variations, particularly in the Sahel region (see A/AC.105/465 and Corr.1, para. 59).

77. The Fisheries Department of FAO will increasingly use remote sensing, mostly in the framework of its growing GIS activities, during implementation of field projects (see A/AC.105/465 and Corr.1, para. 60).

78. FAORSC will continue to cooperate with the FAO Forestry Department in the assessment of existing forest resources and trends in deforestation, forest degradation and plantations (see A/AC.105/465 and Corr.1, para. 61).

79. UNEP will continue through its water programme to cooperate in the assessment of water resources in the ESCWA region (see A/AC.105/491 and Corr.1, para. 81).

80. UNEP, as an Earthwatch activity involving its GRID-Nairobi facility and the Ocean and Coastal Areas Programme Activity Centre, in collaboration with the EC, is planning to develop a coastal atlas for East Africa (including the Indian Ocean islands), demarcating coastal zone types and uses, largely based on classifications derived from Landsat TM images.

81. UNEP's Industry and Environment Programme Activity Centre (IE/PAC) disseminates industrial environmental information worldwide from its International Cleaner Production Information Clearinghouse (ICPIC), using international telecommunications systems, including satellite-based ones.

82. UNEP, through GEMS and GRID, is participating in specifying users' needs, sensor requirements and data management guidelines for remotely sensed data as part of the newly created Committee on Earth Observation Satellites (CEOS) user group, which will specify in some detail the future requirements for satellite data that until now have been defined, to a large extent, by sensor capabilities.

83. As part of Earthwatch, UNEP's newly established GRID cooperating centres in Poland and Brazil will be important focal points for remote sensing and GIS analysis of national environmental problems, as well as providing initial points of contact for regional data for GRID from Eastern Europe and Amazonia, respectively.

84. UNEP's GEMS Programme Activity Centre, as part of its on going activities in the framework of Earthwatch related to the status of the African elephant throughout its range, is fostering usage of satellite-based positioning technology during surveys of elephant populations and their behaviour in Kenya. Traditional aerial survey techniques have been augmented by real-time use of Global Positioning System receivers on aircraft and vehicles to provide accurate spatial coordinates for herds as they are being counted. In addition, members of some herds have been fitted with radio transponders which, when interrogated during daily overpasses of INMARSAT platforms, provide regular spatial coordinates for these herds by which their movements between and around farming communities are monitored.

85. The IGADD and SADCC countries, in collaboration with FAO and the Government of Japan, are continuing to provide early warning systems for food

security programmes in the subregion. Through this project normalized difference vegetation index (NDVI) maps will continue to be produced regularly as essential tools for planners and decision-makers in the Eastern and Southern Africa subregion. With the provision by the French Government of a microwave receiving station for direct reception of NOAA-AVHRR data from the Kenya Meteorological Department to RCSSMRS, countries of the region will easily exchange information and data on climatic changes for better crop planning and yield forecasting.

86. RCSSMRS has developed a project in collaboration with the EC, France and the Netherlands to conduct pilot projects in the States of the Eastern and Southern African subregion for three years. The development of pilot projects is a new strategy in helping indigenous nationals to participate in remote-sensing activities. The pilot projects will be suitably designed so as to involve donor agencies and international organizations.

87. RECTAS has envisaged the following research programmes to be realized in the following three years:

(a) Topographic map revision using SPOT and TM data. This programme is incorporated in the training programmes at the technologist and technician levels;

(b) Remote sensing applications to inland valleys of West and Central Africa. RECTAS is developing methodologies for SPOT and TM data utilization for the characterization of the physical environment of the valleys;

(c) Coastal environmental studies in the West and Central African subregion: RECTAS has been invited to propose a project based on this issue, to be co-managed with a British university under the sponsorship of the British Council;

(d) Elaboration of a desertification assessment methodology. This project will be implemented between RECTAS and IGN International (France) under the sponsorship of UNEP.

88. ECA will formally cooperate with FAO as executing agency on land use and vegetation cover mapping of Africa.

89. FAO is continuing to cooperate with the United Nations International Drug Control Programme on pilot projects to determine narcotic drug plantations from satellite remote-sensing data.

90. The Department of Humanitarian Affairs (DHA) (which has taken over the functions of the Office of the United Nations Disaster Relief Coordinator (UNDRO)) will continue to cooperate with organizations within the United Nations system and other specialized organizations in the study on a practical use of remote-sensing control for disaster management. The secretariat of the International Decade for Natural Disaster Reduction (IDNDR) will continue to promote activities for the application of remote sensing in reducing the human and national development costs of disasters.

91. The Indian Ocean Marine Affairs Cooperation (IOMAC) programme, in collaboration with the United Nations Office for Outer Space Affairs, is planning to undertake small-scale feasibility projects of satellite remote-sensing applications for mapping, monitoring and management of coastal resources (see A/AC.105/465 and Corr.1, para. 67).

3. Dissemination of information on the status of technology

Continuing activities

92. Since 1989, the United Nations Space Applications Programme has published an annual collection of papers selected from among those presented at the meetings, workshops and training courses organized under its auspices. The publication covers different aspects of space science and technology including remote sensing, satellite meteorology, satellite communications and basic space science. It includes papers that are broad in scope and are of enduring interest.

93. ESCAP/UNDP will continue to operate the Regional Information Service (RIS) on remote sensing during 1993 and onward, providing important and interesting RIS output. Four issues of the remote-sensing newsletter and two issues of the Asian-Pacific Remote Sensing Journal will be published in 1992-1993. Reports and proceedings of seminars/workshops/meetings will continue to be published regularly.

94. ECA will continue to publish annually the bulletin on cartography and remote sensing. The bulletin will serve to disseminate information on the status of mapping, remote sensing and GIS in Africa to persons and institutions in member countries involved in planning and development.

95. ECA, with the cooperation of other United Nations agencies and interested national organizations, will prepare a document giving guidelines for the establishment of national geographic information systems; where satellite data will play a major role.

96. ECA, in cooperation with the United Nations Space Applications Programme and other donor countries and agencies, plans to hold a space conference for Africa. It will be held in conjunction with the eighth United Nations Regional Cartographic Conference for Africa at Addis Ababa in February 1993. The main objective is to bring together African decision-makers and scientific leaders to address the regional and global issues with regard to space science and technology for development.

97. UNEP, as an Earthwatch activity, is promoting modern telecommunication methods, including the use of telecommunications via satellite; its International Referral System for Courses of Environmental Information (INFOTERRA) serves as an example (see A/AC.105/491 and Corr.1, para. 95).

98. UNEP, as an Earthwatch activity, through the GEMS Monitoring Assessment Research Centre (MARC), has included satellite-derived data in the Environmental Data Report (see A/AC.105/491 and Corr.1, para. 96). The next edition scheduled for publication in 1993 will most likely include satellite remote-sensing data, a chapter on climate (e.g., monitoring polar ice thickness, sea surface temperatures and other key climate variables) and a chapter on natural resources (e.g., monitoring the extent of forest or rangeland resources and other types of land cover, and tracking wildlife). Sources for such data are NOAA and the Fish and Wildlife Service in the United States, as well as the National Environment Research Council (NERC) in the United Kingdom of Great Britain and Northern Ireland.

99. The work of UNEP on genetic resource databases and networks continues (see A/AC.105/491 and Corr.1, para. 97).

100. As an Earthwatch activity, UNEP, through GEMS, will continue to cooperate with UNESCO and the Swiss Federal Institute of Technology, Zurich, in a World Glacier Inventory during 1993 and beyond; a computer-based glacier database continues to operate for advanced analysis of glacier and climate data. UNEP plans to publish a popular brochure on glaciers and the environment.

101. UNEP, through the GRID programme, publishes the GRID News quarterly newsletter, which includes examples of the application of GIS and remote-sensing techniques for analysing environmental issues and has over 4,000 recipients. In addition, the ongoing GRID Information series and Case Studies series detail individual activities to which GRID has provided GIS and remote-sensing image processing support.

102. The World Conservation Monitoring Centre (WCMC), jointly funded by IUCN, the World Wildlife Fund (WWF) and UNEP is continuing its role as a component of the GEMS monitoring network (see A/AC.105/491 and Corr.1, para. 104). Volume 3 of the Conservation Atlas of the Tropical Forests of the World (Latin America) will be published in 1993. The Antarctic database produced in collaboration with the British Antarctic Survey, the Scott Polar Research Institute and member countries of the Scientific Committee on Antarctic Research is also expected to be finalized during 1993.

103. FAO will continue to publish technical reports on agriculture, fisheries and forestry applications of remote sensing and GIS in 1993-1994 and future years.

104. FAO plans to introduce a new series of remote-sensing publications for decision-makers. Emphasis will be on management aspects, such as cost-benefit analysis, rather than on detailed description of techniques.

105. FAO plans to strengthen further its role as the clearing-house for information on the agricultural, forestry and fisheries applications of remote sensing. In 1994 its Remote Sensing Centre plans to publish a quarterly FAO Remote Sensing Newsletter.

Special projects or ad hoc activities

106. The WHO Division of Environmental Health, in collaboration with other relevant WHO programmes and United Nations agencies, will organize an experts meeting on remote-sensing applications for human health in 1993.

107. FAO, with funding support from the Government of the Netherlands, continues to provide operational remote-sensing inputs into the Global Information and Early Warning System on Food Security (GIEWS) and the Desert Locust Prevention Programme through the upgraded ARTEMIS. Research work will continue on the integration of remote-sensing-based and meteorological rainfall estimates and on improvement of the length of growing periods data. The ARTEMIS vegetation index products will be extended to cover the whole of Asia and Latin America in addition to their current coverage of Africa and South-East Asia. FAO will develop a 10-year archive of ARTEMIS vegetation data.

108. GIEWS has the unique responsibility of providing early warning of food security emergencies for the whole world. Remote sensing and agrometeorological data and information are used as one of the inputs in the evaluation and assessment process. A GIEWS computer workstation was designed to incorporate all necessary inputs and functions in a single package, i.e., satellite image display and analysis, agrometeorological map display and analysis, map-image overlays, spreadsheet manipulation, graphic output production, file transfer between programmes and database creation. The development of the GIEWS workstation, funded by the EC, was begun in 1992 in cooperation with the University of Arizona, United States, and will take two years.

109. FAO, as a spin-off of ARTEMIS development, in cooperation with the Government of the Netherlands, prepared a project proposal which is being considered by the Government of the Netherlands for funding in 1993, for the design of a dedicated image processing and GIS system for assessment and monitoring of forest cover based on high-resolution remote-sensing optical and microwave image data.

110. FAO's Forest Resources Assessment 1990 project is based upon the use of representative samples of multidate, high-resolution optical and microwave remote-sensing image data for the assessment and monitoring of tropical forest cover and land use. Change matrices will be derived which describe in more detail than heretofore possible the changes over time in the variables observed at the global, regional and subregional levels which should lead to a better understanding of the processes of deforestation and forest degradation.

111. FAO, in cooperation with ECA, is continuing preparatory activities for a regional project entitled "Africa Land Cover Map and Digital Geographic Database". Its objective is to provide reliable and timely geographic information needed for sustainable management of land and water resources and for environmental protection. The project, which is to be implemented by African regional remote-sensing centres with planned inputs from UNEP and

UNESCO, will strengthen their capacities. Subject to availability of funds, the project will start in 1993.

4. Establishment of centres for space science and technology education

112. In response to General Assembly resolution 45/72 of 11 December 1990, in which the Assembly called for the establishment of regional centres for space science and technology education in the developing countries, the United Nations Programme on Space Applications has developed proposals (see SAP/90/001-004) and has undertaken a number of consultations with member States and international organizations (see A/AC.105/498 and Corr.1).

113. The United Nations Programme on Space Applications carried out evaluation missions to the ECLAC region in 1992 and will continue to carry out such missions to other regions in 1993. The purpose of the evaluation missions is to provide an accurate and informative report that could assist in the selection of the host country/institution(s) for each regional centre. The report of the mission should provide a clear evidence that the Governments and potential host institutions visited will provide the support necessary for the centre's successful establishment and sustained operation.

114. Each of the centres will be housed in a major science-and-technology-oriented university or a space research institution with an ongoing education programme to afford the centre optimal utilization of the existing professional staff and physical infrastructure at the host institution. The centre's initial programme will focus on remote-sensing technology and related application disciplines. Each of the centres will be specifically designed so that it may:

(a) Contribute significantly to indigenous capability development in remote sensing, including satellite meteorology and environment-related disciplines in each participating country;

(b) Enhance scientific and technical education in each participating country;

(c) Enhance the quality and quantity of contributions of graduates of participating countries in the overall development of their respective nations and in the management of their resources and their environment;

(d) Strengthen the capabilities of institutions of higher learning and national/regional remote-sensing user assistance and training centres.

115. ESCWA is continuing its efforts to follow up on establishing the ESCWA Centre for Outer Space Science and Technology Education. Invitations to host the Centre were circulated to a number of countries which showed an interest in doing so; three countries have so far offered their facilities for hosting the Centre. Contacts have also been made to organize an evaluation mission in

the region to assess the adequacy of the facilities offered to host the Centre.

116. ECA, in cooperation with the United Nations Office for Outer Space Affairs, will foster the establishment of a regional centre for space science education in Africa as a contribution to strengthening the human resources development in the region, complementing the training currently offered by the existing regional centres.

117. The United Nations/Indonesia Regional Conference (see para. 12 (c) above) and the United Nations/ECA Conference (see para. 12 (g) above) will be used as a platform to launch the Centres.

B. COMMUNICATIONS

1. Education and training programmes

Training courses/workshops/seminars

118. The United Nations Space Applications Programme plans to hold the following training courses/workshops/seminars:

(a) United Nations/Greece International Seminar on Space Communications Systems, to be held in cooperation with the Government of Greece, Athens, May 1993;

(b) United Nations/Mexico Regional Workshop on Space Technology to Combat Natural Disasters, to be held in cooperation with the Government of Mexico, Mexico City, September 1993;

(c) United Nations Workshop on Communications Technology, to be held in Europe, 1994.

119. The World Health Organization (WHO) will continue its efforts towards the development and strengthening of communications systems support to primary health care in remote areas. For example, the subject-matter of WHO's annual International Seminar on the Uses of Microcomputers in the Management of Health Care Services, of which nine have so far been concluded and which benefited 155 individuals from 74 countries, is being expanded to include a session on computer-assisted telecommunications. The activities will include increasing training opportunities and the promotion of intersectoral collaboration and technical cooperation among developing countries (see A/AC.105/415, para. 68).

120. DHA/UNDRO, following its 1991 Tampere Conference on Disaster Communications, will convene a conference in 1993 for the negotiation of an international convention on disaster communications, establishing mechanisms to improve international cooperation.

121. DHA plans to continue to participate in regional workshops/seminars on disaster communications for 1993-1994 and beyond.

Fellowships

122. Through the United Nations Programme on Space Applications, Governments and international organizations are providing long-range fellowship support for candidates from developing countries, as follows:

(a) The Government of Austria has renewed its offer of two fellowships for study and training in the area of microwave technology for satellite communication. These fellowships are tenable in 1992-1993 at the Technical University of Graz, Austria;

(b) ESA has renewed its offer for two one-year fellowships in the field of communications tenable at the European Space and Technology Centre (ESTEC), Noordwijk, the Netherlands, in 1993.

2. Expert services and survey missions to identify specific areas of applications relevant to a given country or group of countries and to carry out specific studies on pilot projects

Provision of expert services

123. Activities of the International Telecommunication Union (ITU) in the area of satellite communications include the following:

(a) ITU will continue to provide, at the request of member administrations, the experts participating in satellite Earth station projects and in the planning of regional or domestic satellite communication systems;

(b) ITU will participate in or organize seminars on satellite communications for developing countries;

(c) Member administrations will continue to be informed regularly through the International Frequency Registration Board (IFRB) Weekly Circular and the special sections annexed thereto of frequency assignments and orbital positions communicated to the board in space radio-communication services. IFRB will also respond to requests for advice from administrations on specific topics or in providing information and documents, mainly in relation to space radio-communication services.

Study and pilot projects

124. The ITU/RASCOM feasibility study was considered by the Conference of African Ministers for Telecommunications, held at Abuja, Nigeria, in 1991. The RASCOM organization, which will be based in Côte d'Ivoire, will start operations by the pooling of transponders of countries which operate or plan

to operate domestic networks. The objective of the RASCOM project is to provide an efficient and economical means of telecommunications and information services, with a view to fostering the socio-economic and cultural development of African countries. The requirements for satellite sound and television broadcasting for all African countries are included in the project, using the appropriate technologies of a regional African satellite system which is to be properly integrated in the existing and/or planned national networks.

125. UNESCO activities included the following:

(a) UNESCO, as a member of the Inter-Agency Consultative Committee (IACC) on the RASCOM project, is acting in an advisory capacity and is providing assistance to this project;

(b) With respect to the decisions and recommendations of UNISPACE 82, UNESCO and the International Programme for the Development of Communication (IPDC) will continue to make every effort, within the scope of their mandate and subject to the availability of financial resources, to assist all member States, in particular the developing countries, to promote the use of space technology for economic, social and cultural development;

(c) Either by itself or in collaboration with the International Labour Organisation (ILO) and the World Intellectual Property Organization (WIPO), UNESCO will undertake various actions to encourage further ratifications and acceptances of the Convention Relating to the Distribution of Programme-carrying Signals Transmitted by Satellite (Brussels, 1974). The search for solutions of the copyright and neighbouring rights problems raised by the use of satellites for broadcasting purposes will remain one of UNESCO's concerns. In particular, this relates to the copyright problems raised by the case of the direct broadcasting satellites. The legal aspects of the use of satellite remote-sensing data may also be explored.

126. UNESCO is continuing to examine different ways and means of making wider use of low- and geostationary-orbit satellites systems for communication, information, informatics, education, sciences, culture and environmental protection in the implementation of the programmes and projects.

(a) At the twenty-sixth session of the General Conference (1991), Spain proposed that UNESCO should join the HISPASAT project. This satellite will cover Spain in direct broadcasting (DBS) and Latin America, Central America and the Caribbean (Fixed Satellite service - FSS). It also foresees programmes for distant education. It is envisaged that in cooperation with the UNESCO Regional Office in Santiago, a study will be carried out on the establishment of a satellite network for education in connection with HISPASAT;

(b) Within the framework of the recovery plan of PANA, a satellite communication network for exchange of information will be established by linking most of the national agencies in Africa (INTELSAT).

These activities are conducted in close cooperation with the United Nations specialized agencies, national/regional space institutions and non-governmental organizations (NGOs), as well as interested member States.

127. FAO, in cooperation with ESA, in 1992 started testing the DIANA satellite communication system, which has been developed by European industry under ESA management. The DIANA system continues to provide a real-time link between FAO headquarters and user terminals in Nairobi, Kenya, Harare, Zimbabwe and Accra, Ghana. System testing will continue for one year and will include real-time transmission of ARTEMIS products as well as other data and documents.

128. Concerned ESA member States as well as UNEP have developed an advanced proposal for the initiation of a high-speed international data communication system named MERCURE. In concept and structure, MERCURE will be closely allied to DIANA (see A/AC.105/491 and Corr.1, para. 5), but includes plans which aim at global coverage based on current GRID cooperating centres, including Arendal (Norway), Bangkok, Geneva, Kathmandu, Nairobi, San José dos Campos (Brazil), Sioux Falls (United States), Split (Croatia) and Suva (Fiji). The need to provide UNEP with a modern global communication capability for the transfer of information between headquarters and affiliated centres and between GRID and other archives and users of environmental data is generally accepted. The longer-term potential for MERCURE serving wider UNEP and United Nations communications needs is also a major driving factor. MERCURE is planned to start by late 1994.

129. WHO is following the progress of the development of satellite networks to improve health conditions, particularly for enhanced communications support in rural areas (see A/AC.105/465 and Corr.1, para. 99). WHO continues to use the low-orbit satellite services of SatelLife, primarily for electronic mail (E-mail) services between six African member States, the WHO Regional Office for Africa and WHO headquarters at Geneva. Similar plans are being made for low-orbit communications uses by some of the WHO member States of the Eastern Mediterranean Region. Also, WHO is studying the feasibility of an offer by the Russian authorities for the use of existing and to-be-launched Russian low-orbit satellites for worldwide communications, particularly covering the geographical areas not already served.

130. The WHO-executed Onchocerciasis Control Programme is currently expanding its network and the tele-transmission of hydrological information through its own emitting and receiving stations in 11 West African countries.

131. DHA and the IDNDR secretariat will continue to cooperate with organizations within the United Nations system and other specialized organizations in the study and practical use of satellite terminals, and low-orbit satellite systems (LEO) for emergency communications.

3. Dissemination of information on the status of technology

132. ITU permanent organs will continue to contribute in this sphere with the following activities:

(a) Studies on technology and spectrum utilization for space communications will be continued in the study period 1990-1994, in the light of technological developments by CCIR study groups 1, 4, 5, 7, 8, 10, 11 and 12;

(b) Supplement No. 1 (Effect of WARC-88 Decision) to the CCIR Handbook on Satellite Communications (Fixed-Satellite Service) has already been published. Supplement No. 2 (Computer Programmes for Satellite Communications), currently under preparation, was published in 1992. Supplement No. 3 (Very Small Aperture (VSAT) Systems and Earth Stations) and Supplement No. 4 (Satellite Links in the Integrated Service Digital Network (ISDN)) are in preparation;

(c) The CCIR handbook on satellite-based services of time and frequency dissemination, currently under preparation, is expected to be finished by the end of 1992;

(d) The International Telegraph and Telephone Consultative Committee (CCITT) is continuing its work on a study programme concerning space technology in the area of services, e.g., aeronautical mobile services, maritime mobile services, land mobile services, and in the field of integrating satellite systems into the general telecommunication network. Accordingly, it is studying the use of telecommunication satellites for a whole range of transmissions: telephony, television, teleconference, data transmission, business services, communications between computers, telecommunication services to remote regions and weather forecasting. Where necessary, it also develops the signalling associated with these various types of information, and for the interworking of networks. The studies in progress relate in particular to the preparation of standards for digital networks;

(e) The International Frequency Registration Board (IFRB) organizes biennial (regular) seminars in Geneva and intra-year regional seminars on frequency management and the use of the radio-frequency spectrum and the geostationary-satellite orbit, with a view to providing technical assistance to the participating countries;

(f) ITU publishes monthly in its Telecommunication Journal a list of satellites launched, together with the associated information on technical parameters;

(g) The Union also publishes a Report on Telecommunication and the Peaceful Uses of Outer Space;

(h) ITU is organizing world and regional TELECOMs (Telecommunications Exhibitions and Forums). Asia Telecom 93 will be held at Singapore from 17 to

22 May 1993, followed by Africa Telecom 94 (venue and date to be determined). World Telecom 95 will be held at Geneva from 2 to 11 October 1995.

133. IFRB publishes quarterly an updated list of the orbital positions assigned to space stations on board geostationary satellites and certain non-geostationary satellites, with the corresponding frequency bands and, in a detailed manner, all the technical characteristics of satellite networks in the process of coordination or recorded in the Master International Frequency Register.

134. The UNEP-International Cleaner Production Information Clearinghouse (ICPIC) is an on-line computerized information exchange system, part of the UNEP Cleaner Production Programme to promote the use of clean production technologies on a global scale. The system provides three direct-access nodes through the telephone network and another eight access nodes through Telenet, a data packet switching system (PSS), or through another national PSS such as Thaipac for Thailand or the United Kingdom PSS. The system should be able to meet immediate and near-future on-line access requests during 1993 and beyond.

135. WHO will pursue its efforts to develop and strengthen communications systems in support of primary health care gained by promoting the exchange of information and experiences and by recommending effective means of communication. Increasingly, requests to WHO for support to Member States in the area of computing include requests relating to computer-assisted telecommunications. Furthermore, research institutions are advised and assisted to connect to the international electronic mail (E-mail) services serving the academic and research community.

4. Regulation of the use of the geostationary satellite orbit and the radio-frequency spectrum allocated to space communication services

136. The Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space will continue in 1993, in accordance with General Assembly resolution 47/67 of 14 December 1992, to consider, through its Working Group, matters relating to the definition and delimitation of outer space and to the character and utilization of the geostationary orbit, including consideration of ways and means to ensure the rational and equitable use of the geostationary orbit without prejudice to the role of ITU.

137. The World Administrative Radio Conference (WARC-92) for dealing with frequency allocations in certain parts of the spectrum allocated a number of the frequency bands for new space service applications: for space operations and space research services; for satellite sound broadcasting; for wide RF-band, high-definition television (HDTV); for the mobile-satellite service; for low-orbit satellites, etc.

138. The 19 new or revised resolutions and recommendations of WARC-92 request future studies by CCIR in the field of space radio-communications. A number of urgent ones cover:

(a) Compatibility between the fixed-satellite service (Earth-to-space) and the space research and Earth exploration satellite services in the 13.75-14 GHz band;

(b) Multi-service satellites and the fixed-satellite service in the 20-30GHz frequency bands;

(c) The mobile-satellite service and other services in the same frequency bands;

(d) Protection of the space services operating in the bands near 2 GHz from harmful interference from emissions by stations of the mobile service;

(e) Implementation of HDTV in the 12-GHz band in the countries with climatic zones having a high rainfall rate;

(f) Introduction of satellite and terrestrial digital sound broadcasting;

(g) Establishment of standards governing the operation of low-orbit satellite systems;

(h) The spurious emissions resulting from space services transmission.

The first study should be completed prior to 31 January 1994.

139. The International Civil Aviation Organization (ICAO), assisted by the Special Committee of the Council on the Monitoring and Coordination of Development and Transition Planning for the Future Air Navigation System (FANS Phase II) (see A/AC.105/491 and Corr.1, para. 130), will continue to examine technical, financial, managerial and legal institutional and cooperative aspects required for the refinement of the communications, navigation, and surveillance and air traffic management (CNS/ATM) systems. Many ICAO programmes are now being directed to facilitate the implementation of the CNS/ATM systems on a global basis.

140. WIPO will continue to study various aspects of the law of copyright and so-called neighbouring rights (that is, rights granted to performers, producers of phonograms and broadcasting organizations) that relate to the use of new technologies, including broadcasting by satellites. WIPO's programme for 1992-1993 contains provisions for continuing preparation of a possible protocol to the Bern Convention for Protection of Literary and Artistic Works which is to deal with a number of questions, inter alia, the questions of broadcasting by satellites. Those questions will also be dealt with in the context of other proposed activities, such as the preparation of a WIPO model law on the protection of producers of sound recordings and a WIPO international symposium (which is anticipated to be held at Harvard University, Cambridge, Massachusetts, United States, in March-April 1993) on the impact on copyright of digital technology, including digital broadcasting by satellites. The above-mentioned activities will probably be continued in the 1994-1995 biennium.

C. METEOROLOGY AND HYDROLOGY

1. Education and training programmes

Training courses/workshops/seminars

141. WMO plans to continue to collaborate with the United Nations, FAO, ESA and other organizations in the co-sponsorship of training events during 1993, including the following:

(a) Workshop on global sea-surface temperature (SST) analysis techniques for long-range weather forecasting research;

(b) Training seminar on use of environmental satellite data;

(c) Third international workshop on tropical cyclone warnings;

(d) Third technical conference on SPECTRUM;

(e) WMO/IOC technical conference on space-based ocean observations.

142. The WMO proposals for satellite-related events for the biennium 1994 and 1995 include the following:

(a) Training courses on tropical meteorology and tropical cyclones;

(b) Training on communication and data management;

(c) Training Seminar on Aeronautical Meteorology.

143. UNEP will continue its work with the African Centre for Meteorological Applications for Development (ACMAD) (see A/AC.105/491 and Corr.1, para. 135).

Fellowships

144. WMO grants fellowships under its Voluntary Cooperation Programme (VCP) and its regular budget as well as under UNDP and trust funds for studies or training in meteorology and operational hydrology, including studies and training in satellite meteorology, interpretation of meteorological satellite photographs, satellite transmission systems and nephanalysis. In addition to fellows being trained at some of the WMO regional meteorological training centres, the United Kingdom, the United States and France provide training in numerical weather prediction products and interpretation of meteorological satellite data through fellowships offered by them under VCP.

145. Through the United Nations Programme on Space Applications, ESA has renewed its offer for a one-year fellowship in the field of meteorology tenable at the European Space Operations Centre (ESOC), Darmstadt, Germany, in 1993.

2. Expert services and survey missions to identify specific areas of applications relevant to a given country or group of countries and to carry out specific studies on pilot projects

146. As part of joint United Nations/ISY and ESA activities, ESA has started distributing space-acquired data to a number of African research and applications institutions/centres in four of the countries that are within the coverage of its satellite data receiving stations at Maspalomas and Fucino. In 1993 ESA will assess the performance of these institutions in order to determine their needs, particularly in personnel development.

147. In accordance with the recommendations of the United Nations IOMAC meeting held at Karachi, Pakistan, in July 1989 (A/AC.105/439, paras. 12-35), arrangements are being made for a pilot project with the NOAA/National Environmental Satellite Data and Information Service (NESDIS) consisting of two teams of four to five remote-sensing scientists from the IOMAC member States to work together for about six months (see A/AC.105/465 and Corr.1, para. 122).

148. The application of satellite technology in meteorology and operational hydrology forms an important element of the technical cooperation activities of WMO. These activities are generally undertaken with assistance from the voluntary cooperation programmes of either WMO or UNDP. The following activities are planned for 1993 and future years:

(a) Africa. A number of countries, including Germany, France, the United Kingdom and the United States, are donating data collection platforms (DCPs) for the collection of meteorological data via the geostationary meteorological satellite Meteosat to 15 countries in Africa in order to upgrade meteorological observations (see A/AC.105/491 and Corr.1, para. 139). During 1993 MDD will be evaluated as part of the operational World Weather Watch System Evaluation for Africa (OWSE-AF) in the Niger, within the framework of the AGRHYMET programme phase III (1987-1991) which permits the centre to receive daily real-time data from NOAA satellites and meteorological information from Meteosat. Some key stations in the Zambezi river basin will be equipped with DCPs using the Meteosat system for collecting data. A multi-donor project is now under preparation to monitor the weather conditions affecting development, growth and movements of desert locusts in Africa. Under the project 50 automatic stations will be installed. In the Niger river basin, 64 DCPs using the Argos system have been operational for a number of years, and plans are being made to install more recent equipment. In collaboration with the World Bank, WMO has drawn up plans to set up in Africa an advanced hydrological and environmental monitoring system using Meteosat. About 100 stations will be installed on major rivers, costing over a period of five years between $10 million and $20 million.

FAO, in the framework of the ARTEMIS phase III project, will continue a major satellite rainfall estimation calibration programme in cooperation with the University of Reading, United Kingdom, and regional FAO projects in the

IGADD and SADCC regions. Under this programme, the ground-measured rainfall data from approximately 1,000 meteorological stations in Africa are systematically correlated with cold cloud duration data derived from the ARTEMIS hourly Meteosat observations. Meteosat-based quantitative rainfall estimates are obtained by linear regression. Their accuracy is expected to increase with extended duration of the calibration programme;

(b) Asia. UNDP provides valuable assistance to developing countries in Asia and the South Pacific region through national as well as regional projects. Satellite ground stations were installed in Bangladesh, the Democratic People's Republic of Korea, the Islamic Republic of Iran, Sri Lanka, Viet Nam and Yemen. A UNDP country programme in China has provided a modern satellite data archiving and retrieval system. Automatic weather stations have been installed on the Cook Islands, Solomon Islands and in Tokelau with UNDP support;

(c) Americas. As part of a project of FINNIDA, meteorological communications via satellite are planned to be used for the seven countries of Central America. Studies are under way for a possible application of the same technology to the remaining countries in the southern part of WMO regional association IV. In Colombia, 25 DCPs have been installed in the Magdalena-Cauca basin for hydrological forecasting purposes using NOAA geostationary environmental satellites (GOES).

3. Dissemination of information on the status of technology

149. The application of satellite technology is particularly important in activities carried out under the Tropical Cyclone Programme (TCP) (see A/AC.105/491 and Corr.1, para. 141) to mitigate disasters caused by tropical cyclones.

150. Within the framework of the WMO plan of action for the International Decade for Natural Disaster Reduction, a special project on a tropical cyclone warning system for the south-west Indian Ocean region has been established (see A/AC.105/491 and Corr.1, para. 142).

151. Considerable efforts continue to be undertaken within WMO to provide information on developments in the International Maritime Satellite Organization (INMARSAT) (see A/AC.105/491 and Corr.1, para. 143).

152. The use of data collection capabilities on geosynchronous meteorological satellites is growing rapidly. Of particular importance for WMO is the use of the International Data Collection System (IDCS), where the main emphasis is on obtaining data from above ocean areas (see A/AC.105/491 and Corr.1, para. 144). The use of data dissemination capabilities on geosynchronous meteorological satellites is also progressing (see A/AC.105/491 and Corr.1, para. 144). WMO has adopted a new plan for the Regional Meteorological Telecommunication Network (RMTN) in North and Central America based on two-way multipoint telecommunication services via satellite. The new RMTN will link

meteorological centres in Central America and the Caribbean area with the World Meteorological Center, in Washington, D.C. It will provide the telecommunication services required for the operation of the World Weather Watch system and will support the Tropical Cyclone Programme.

153. The overall long-term goals of the WMO/IOC/ICSU World Climate Research Programme (WCRP) are to determine to what extent climate can be predicted and the extent of man's influence on climate:

(a) The scientific plan for WCRP gives high priority to understanding the effects of cloudiness on the radiation energy budget (see A/AC.105/373, para. 68, and A/AC.105/444 and Corr.1, para. 115 (a)). The International Satellite Cloud Climatology Project (ISCCP), set up in July 1983, aimed at the establishment of a five-year global radiance and cloud data set based on observations from the international array of geostationary meteorological satellites and operational polar-orbiting satellites. The project has been extended through June 1995;

(b) Two major observational programmes are involved within WCRP: the study of the inter-annual variability of the Tropical Ocean and the Global Atmosphere (TOGA), 1985-1995 (see A/AC.105/342, para. 88 (b), and A/AC.105/444 and Corr.1, para. 115 (b)) and the World Ocean Circulation Experiment (WOCE), 1990-1995 (see A/AC.105/309, para. 104, and A/AC.105/444 and Corr.1, para. 115 (b)). The decision of France and the United States to proceed with the implementation of the joint Ocean-surface Topography Experiment (TOPEX)/ Poseidon altimetric mission in mid-1992, and the preparation of the European oceanographic satellite mission, ERS-1, are of particular importance for the success of WOCE;

(c) In addition to ISCCP, WCRP has initiated projects to produce monthly fields of sea-surface temperature and precipitation; these projects require substantial amounts of satellite observations;

(d) WCRP is preparing a Global Energy and Water Cycle Experiment (GEWEX), planned for 1995-2000, based on the multinational Earth Observing System (EOS). A major international component of the experiment will be the GEWEX Continental-scale International Project (GCIP) (see A/AC.105/491 and Corr.1, para. 145 (d)).

154. Within its training publications programme, WMO updated publication No. 240, Compendium of Training Facilities for Meteorological and Operational Hydrology (see A/AC.105/465 and Corr.1, para. 129).

155. UNEP has become a co-sponsor of the Global Climate Observing System (GCOS) with WMO, ICSU and UNESCO's IOC. UNEP will provide a staff member to the GCOS secretariat and will actively participate in developing and supporting its programmes (see A/AC.105/491 and Corr.1, para. 149).

156. UNEP is continuing its ongoing close cooperation within the Global Ozone Observing System (GO_3OS) (see A/AC.105/491 and Corr.1, para. 148).

157. UNEP is also continuing its Global Atmosphere Watch (GAW) as an early warning system (see A/AC.105/491 and Corr.1, para. 150).

158. UNEP, through GEMS, will continue to support the International Satellite Land-Surface Climatology Project (ISLSCP) (see A/AC.105/491 and Corr.1, para. 160).

159. Climate monitoring activities within the World Climate Data and Monitoring Programme (WCDMP) of WMO involve satellite data including sea-ice, snow cover, solar radiation, aerosol optical depth, albedo and clouds (see A/AC.105/359, para. 80). WMO's climate data information referral system (INFOCLIMA) includes information on some available satellite data sets needed for climate monitoring and research. The World Climate Applications and Services Programme (WCASP) continues to investigate and promote the development of potential uses of satellite data in climate applications. WMO recently established the major Climate Change Detection Projects that widely use satellite data.

160. A new Global Atmosphere Watch (GAW) system was established as an early warning system to detect changes in the greenhouse gases, including ozone, and pollutants. Ground observations made in the Background Air Pollution Monitoring Network (BAPMoN) will continue to provide information required to verify future satellite-based observations of some atmospheric constituents. The Global Ozone Observing System (GO_3OS), guided and coordinated by WMO, will measure the atmospheric ozone with more than 150 ground-based stations, supplemented by a few satellite observing systems. Such activities contribute to Earthwatch by providing data to GEMS.

161. The WMO Commission for Atmospheric Sciences (CAS) continues to rely on the use of satellite data for research, for both climate studies and weather analysis and prediction of all time scales (see A/AC.105/491 and Corr.1, para. 151). The WMO Programme on Short- and Medium-range Weather Prediction Research (PSMP) will study the application of high-resolution quantitative satellite data.

162. Based on the structure of WMO's hydrology and water resources programme, a number of projects relating to hydrological networks and instrumentation, hydrological forecasting methods and systems, and the application of remote-sensing techniques to operational hydrology are undertaken on a continuing basis. The programme is revised by the WMO Commission for Hydrology every four years. The results of the projects formulated by the Commission at its ninth session in 1992 will be available in 1996. Based on the Third Long-term Plan of WMO approved by the XIth Congress, this will include satellite activities relying on data for hydrological purposes collected or transmitted by satellites.

163. The WMO Commission for Marine Meteorology (CMM) and the Joint IOC/WMO Working Committee for the Integrated Global Ocean Station System (IGOSS) maintain a close interest in the use of satellites for both ocean measurement and communications. A CMM/IGOSS group of experts is preparing a consolidated

report on oceanographic satellite programmes and the use of their data from these satellites. A joint WMO/IOC technical conference on operational ocean remote sensing is being planned for August/September 1993.

164. The joint rapporteurs of the WMO Commission for Agricultural Meteorology have prepared a report on developments in operational remote sensing for application to agriculture. The report will be considered by the Commission at its tenth session for further activities in the field.

165. Executive Heads of WMO, IOC (UNESCO), UNEP and ICSU have signed a Memorandum of Understanding establishing the Global Climate Observing System (GCOS). The objectives of GCOS are to meet the information requirements for:

(a) Monitoring the Earth climate, detecting meaningful global climate changes and long-term responses to human actions, as well as consequent impacts on the environment, especially terrestrial vegetation;

(b) Climatological applications to national economies and development;

(c) Climate research and prediction of impeding climate changes.

The Memorandum of Understanding established a Joint Scientific and Technical Committee and a Joint Planning Office for GCOS. At its inaugural meeting, the Committee recommended the development of an implementation plan which would guide the development of a climate observing system. The Committee supported the use of specific task groups to provide scientific and technical justification for observational systems in critical areas (e.g., atmospheric processes, oceanic processes, biosphere, hydrosphere). GCOS will call upon national and international organizations and relevant agencies and institutions to participate in its implementation.

166. Within the framework of IHP, UNESCO, in cooperation with the International Association of Hydrologists, will support the organization of the International Conference on Applications of GIS in Hydrology and Water Resources Management (Austria) as well as a post-conference workshop on the same topic (Italy) in 1993.

167. UNESCO will publish a guideline on geographical information systems and applications to water resources management and will provide guidance material for the determination of information system requirements.

168. UNESCO, within the framework of IHP and in cooperation with ESA and the Ministry of Environment of Venezuela, will implement a pilot project using ERS-1 to delineate the hydrographic network in tropical forest areas.

169. UNESCO, in cooperation with WMO and within the framework of the International Geosphere-Biosphere Programme, is planning to carry out a study on an environmental model for a climatic water resources and information system. The aim of the study is to provide facilities to South American countries for water resources and environmental impact assessment studies.

170. ITU/CCIR Study Group 7 will continue to study questions relating to the meteorological-satellite service and associated technologies through the next study period, 1990-1994.

D. BASIC SPACE SCIENCE

171. A United Nations/ESA/Planetary Society workshop on basic space science is scheduled to take place in Africa in 1993. A similar workshop will be held in Asia in 1994.

E. LAND, MARITIME AND AERONAUTICAL MOBILE SERVICES

172. Following the 1988 IMO Maritime Safety Conference, the amendments adopted to the International Convention for the Safety of Life at Sea (SOLAS) at the Conference entered into force on 1 February 1992. The Global Maritime Distress and Safety System (GMDSS) is being introduced in stages and will be fully implemented on 1 February 1999. Satellite communications form a major part of GMDSS, and ships are being encouraged to install satellite equipment. IMO is also continuing the preparation of a master plan of shore-based facilities for GMDSS.

173. The further development of GMDSS to provide for its orderly introduction will be continued by IMO in close cooperation with ITU/CCIR, WMO, IHO, INMARSAT and the System for Search-and-Rescue Operations (COSPAS-SARSAT).

174. The WHO Regional Office for Europe will continue to test a disaster management work programme from public health aspects. For disaster management, the programme will undertake research-and-development activities in a few countries to assess the feasibility and efficiency of using the INMARSAT services TT-3020-A Standard-C Satellite Transceiver for receiving and communicating information on disasters for prompt and appropriate response. During the Turkish earthquake disaster in March 1992, satellite communication was used with excellent results. The Regional WHO Office for Europe is therefore in the process of acquiring an additional INMARSAT TT-3020-A Standard-C Satellite Transceiver to be placed permanently in Ankara.

175. IMO has undertaken studies on a worldwide radio-navigation system and adopted a policy for recognition and acceptance of such systems (IMO resolution A.666 (16)). On the basis of that policy, amendments to the 1974 SOLAS Convention will be considered when IMO is satisfied that a suitable radio-navigation system meeting its requirements is operational; the Global Positioning System (GPS), which is a candidate system, is expected to be available for consideration and acceptance in 1993.

176. IMO, in close cooperation with CCIR and the International Hydrographic Bureau, is also undertaking a study for a worldwide system of transmission and electronic display of nautical information on board ships, including means of updating the electronic navigation chart, which will be broadcast through the

INMARSAT enhanced group and SafetyNet system. Tests of equipment based on a provisional performance standard are expected to be completed in 1993 and an operational performance standard developed.

177. ITU/CCIR Study Group 8 (mobile services), and particularly its Working Party 8 D, will continue to deal with technical and operating characteristics necessary for compatibility, inter-operability and the required performance levels for systems in the mobile satellite services. Task Group 8/1 of the Study Group will deal with the satellite components of the Future Public Land Mobile Telecommunication Systems.

F. OTHER ACTIVITIES IN THE FIELD OF SPACE SCIENCE AND TECHNOLOGY AND ITS APPLICATIONS

178. UNIDO has developed an "Outline of a UNIDO Programme for Realizing the Benefits of New Technology Spin-offs in Developing Countries (with particular reference to space technologies)", intended to promote cooperation between developed and developing countries for realizing the benefits of space technology spin-offs in developing countries.

179. The Committee on the Peaceful Uses of Outer Space at its 1992 session was able to reach consensus on a set of principles relevant to the use of nuclear power sources in outer space and recommended their adoption by the General Assembly. The Committee noted the need for early review and possible revision of the principles. Its Legal Subcommittee will therefore, in accordance with General Assembly resolution 47/67 of 14 December 1992, consider, through its Working Group, the question of early review and possible revision of the principles relevant to the use of nuclear power sources in 1993. It will furthermore consider, through its Working Group, the legal aspects related to the application of the principle that the exploration and utilization of outer space should be carried out for the benefit and in the interests of all States, taking into particular account the needs of developing countries.

G. INTERNATIONAL SPACE YEAR ACTIVITIES

180. The United Nations and its specialized agencies carried out a series of activities in celebration of International Space Year in conformity with General Assembly resolution 44/46 of 8 December 1989, by which the Assembly had endorsed the initiative of international scientific organizations and bodies to designate 1992 as International Space Year, as well as subsequent recommendations of the Committee on the Peaceful Uses of Outer Space. The scope of United Nations ISY activities focused on three major areas: (i) management of the resources of the Earth and its environment; (ii) long-term education programmes; and (iii) public education. Specific activities included, but were not limited to, the organization of a number of workshops, conferences, training courses and special projects. Several projects, such as the establishment of centres for space science and technology education (see section II.A.4. above), will continue in 1993 and 1994.

181. As an affiliate member of the Space Agency Forum for International Space Year (SAFISY), UNESCO made a special effort to strengthen its programmes related to outer space during ISY. The third UNESCO computer-based learning module of the series referred to in paragraph 32 (d) was conceived and identified as a contribution to the International Space Year - 1992.

182. WHO will continue its efforts, guided as appropriate by the deliberations of the proposed Space Agency Forum, to develop and strengthen communications systems in support of primary health care by promoting the exchange of information and experiences and recommending effective communication policies.

183. In chapter 10 (International cooperation) of the UNEP Environmental Data Report published in 1993, GEMS-MARC will give recognition to 1992 as International Space Year, and programmes or significant meetings concerning satellite monitoring of the environment as an early warning system within ISY will be highlighted. As in previous editions of the Report, chapter 10 will include a table highlighting the rapid increase in numbers and types of satellites in orbit and supplementary information about their launches, observations and corresponding space programmes.

184. FAO, as an affiliated member of SAFISY, actively participated in most ISY activities. This has resulted in strengthening cooperation with other SAFISY members, which will have a positive impact on several of the planned joint activities mentioned above in the present report. The exhibition prepared by FAO for the ISY European Conference and for the ISY World Space Congress will become a permanent exhibition at FAO headquarters.

185. WMO will continue its participation in SAFISY. A number of DCPs and DCP receiving stations (DRSs) have been installed in Africa. The DCPs and DRSs transmit and receive respectively meteorological data through Meteosat, thereby facilitating the timely and reliable flow of essential meteorological data from and between developing countries in Africa.